MYSTRAN 3D Solid Element Buckling Study

Models are of a 1"x1"x40" Aluminim beam using MYSTRAN solid elements.

Euler Crit. Buckling Load =

1.285105E+03

lb, based on beam theory

HEXA elements (both 8 and 20 node) are all equal sided cubes

HEXA	HEXA08 Buckling - Mesh Study 2x2x2 reduced integration					
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	1.416631E+03	INV	9.28%		
	<u> </u>		LANCZOS			
"	2x2x80	1.325014E+03	INV	3.01%		
	! L		LANCZOS			
"	4x4x160	1.296666E+03	INV	0.89%		
	<u> </u>		LANCZOS			
"	8x8x320	1.289053E+03	INV	0.31%		
	<u> </u>		LANCZOS			
"	10x10x400	1.288137E+03	INV	0.24%		
	} }		LANCZOS			

HEXA08 Buckling - Mesh Study 3x3x3 full integration						
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	1.981100E+03	INV	35.13%		
			LANCZOS			
"	2x2x80	1.461666E+03	INV	12.08%		
			LANCZOS			
"	4x4x160	1.330584E+03	INV	3.42%		
			LANCZOS			
"	8x8x320	1.297555E+03	INV	0.96%		
			LANCZOS			
"	10x10x400	1.289087E+03	INV	0.31%		
			LANCZOS			

HEXA20	HEXA20 Buckling - Mesh Study 3x3x3 REDUCED integration					
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	1.349083E+03	INV	4.74%		
			LANCZOS			
"	2x2x80	1.307216E+03	INV	1.69%		
			LANCZOS			
"	4x4x160	1.307216E+03	INV	1.69%		
			LANCZOS			
"	8x8x320	1.292383E+03	INV	0.56%		
			LANCZOS			
"	10x10x400		INV			
			LANCZOS			

HEX	HEXA20 Buckling - Mesh Study 3x3x3 full integration					
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	1.320539E+03	INV	2.68%		
			LANCZOS			
"	2x2x80	1.292829E+03	INV	0.60%		
			LANCZOS			
"	4x4x160	1.278065E+03	INV	-0.55%		
			LANCZOS			
"	8x8x320	1.289772E+03	INV	0.36%		
			LANCZOS			
"	10x10x400		INV			
			LANCZOS			

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PENTA elements (both 6 and 15 node) are all equal sided cubes

PENT	PENTA06 Buckling - Mesh Study 2x3 reduced integration					
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	1.521343E+03	INV	15.53%		
			LANCZOS			
"	2x2x80	1.401103E+03	INV	8.28%		
			LANCZOS			
"	4x4x160	1.319949E+03	INV	2.64%		
			LANCZOS			
"	8x8x320	1.295388E+03	INV	0.79%		
			LANCZOS			
"	10x10x400	1.292226E+03	INV	0.55%		
			LANCZOS			

PENTA06 Buckling - Mesh Study 3x7 full integration						
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	4.224469E+03	INV	69.58%		
			LANCZOS			
"	2x2x80	1.524799E+03	INV	15.72%		
			LANCZOS			
"	4x4x160	1.350903E+03	INV	4.87%		
			LANCZOS			
"	8x8x320	1.303139E+03	INV	1.38%		
			LANCZOS			
"	10x10x400	1.292226E+03	INV	0.55%		
			LANCZOS			

PE	PENTA15 Buckling - Mesh Study3X7 reduced integration					
Size		Mesh	MYSTRAN Eigen	Method	% Error	
1"x1"x4	10"	1x1x40	3.350961E+03	INV	61.65%	
			 	LANCZOS		
"		2x2x80	1.299212E+03	INV	1.09%	
				LANCZOS		
"		4x4x160	1.287274E+03	INV	0.17%	
				LANCZOS		
"		8x8x320	1.285804E+03	INV	0.05%	
				LANCZOS		
"		10x10x400		INV		
				LANCZOS		

PEN	PENTA15 Buckling - Mesh Study 2x3 full integration					
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	1.272013E+03	INV	-1.03%		
			LANCZOS			
"	2x2x80	1.284719E+03	INV	-0.03%		
			LANCZOS			
"	4x4x160	1.287274E+03	INV	0.17%		
			LANCZOS	i ! !		
"	8x8x320	1.280372E+03	INV	-0.37%		
			LANCZOS			
"	10x10x400		INV			
			LANCZOS			

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Euler Crit. Buckling Load =

1.285105E+03

lb, based on beam theory

TETRA elements (both 4 and 10 node) are all equal sided cubes

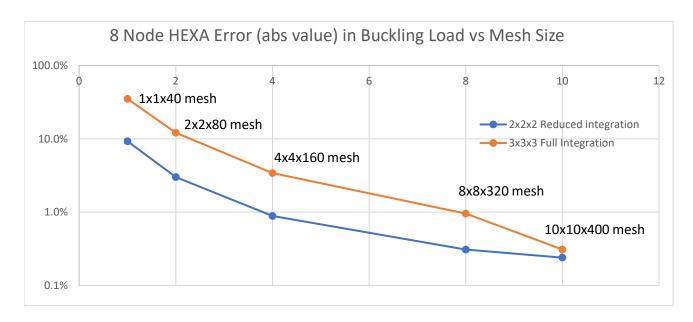
TET	TETRA04 Buckling - Mesh Study 1pt full integration					
Size	Mesh	MYSTRAN Eigen	Method	% Error		
1"x1"x40"	1x1x40	4.224469E+03	INV LANCZOS	69.58%		
"	2x2x80	1.524799E+03	INV LANCZOS	15.72%		
"	4x4x160	1.350903E+03	INV LANCZOS	4.87%		
"	8x8x320	1.303139E+03	INV LANCZOS	1.38%		
"	10x10x400	1.297191E+03	INV LANCZOS	0.93%		

TEI	RA04 Buckli	ngMesh	-Study-4-p	t full integra	tion
Size	RA04 Buckli Mesh	MYSTR	AN Eigen	Method	% Error
1"x4"x40"	134x40				
				LANGZOS	
	A STATE OF THE STA	and the second second			
				LANGZOS	
	4x4x460			147	
				LANGZOS	
	8x8x320	THE REAL PROPERTY AND ADDRESS OF THE PARTY AND	The second secon	The second secon	
	888×320 mm b			LANGZOS	
	I USA ON ALUU			ST-AND ZOTO	
			-	LANGEUS	

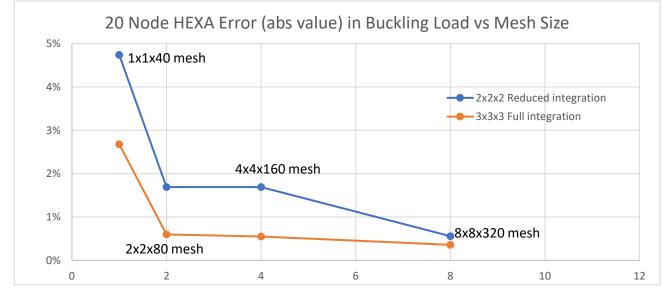
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	ETD Ath Decolul	Mook	Cturdus-fund	Auford Frenchster	tion
	EIKALU BUCKI	mg==west	-otury-i-L	t full integra	LIOII
Size	Mesh	MYSTR	AN Eigen	Method	%-Error
1"x4"x40	13c1xc40				
	124:40			LANGZOS	
		the same of the sa	THE RESIDENCE OF THE REAL PROPERTY.		
	2x2x80			TANGZATO	
	704,467		THE RESERVE THE PARTY AND ADDRESS OF THE PARTY		
	4X4X+0U				
				LANGEUS	
	OXOXOZU	-		FAT	
				The Control of	
	UUXAUXAUU				
				LANGZOS	

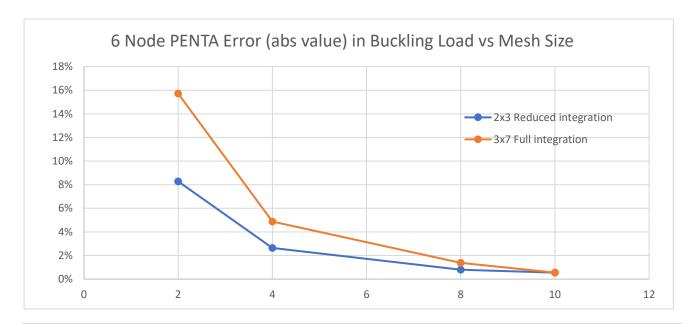
TET	TETRA10 Buckling - Mesh Study 4 pt full integration						
Size	Mesh	MYSTRAN Eigen	Method	% Error			
1"x1"x40"	1x1x40	7.126515E+04	INV	98.20%			
			LANCZOS				
"	2x2x80	1.256695E+03	INV	-2.26%			
			LANCZOS				
"	4x4x160	1.267251E+03	INV	-1.41%			
			LANCZOS				
"	8x8x320	1.275917E+03	INV	-0.72%			
			LANCZOS				
"	10x10x400		INV				
			LANCZOS				



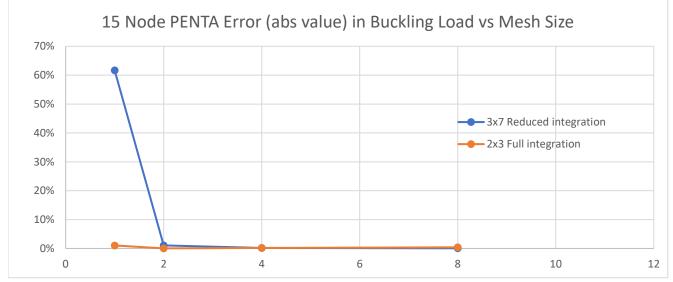
1	9.28%	35.13%
2	3.01%	12.08%
4	0.89%	3.42%
8	0.31%	0.96%
10	0.24%	0.31%



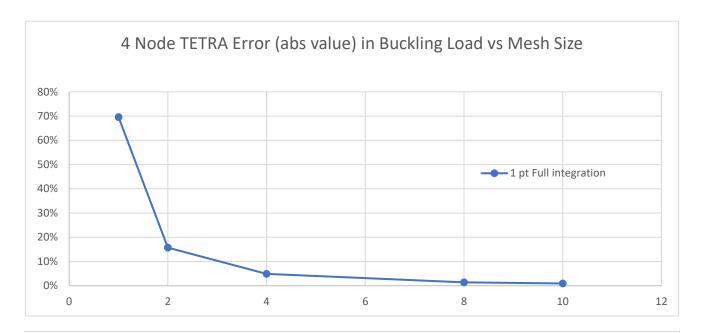
1	4.74%	2.68%
2	1.69%	0.60%
4	1.69%	0.55%
8	0.56%	0.36%



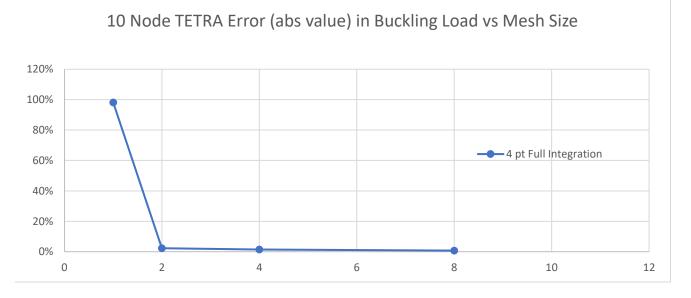
1	15.53%	69.58%
2	8.28%	15.72%
4	2.64%	4.87%
8	0.79%	1.38%
10	0.55%	0.55%



1	61.65%	1.03%
2	1.09%	0.03%
4	0.17%	0.17%
8	0.05%	0.37%
10		



1	69.58%	69.58%
2	15.72%	15.72%
4	4.87%	4.87%
8	1.38%	1.38%
10	0.93%	0.93%



1	98.20%
2	2.26%
4	1.41%
8	0.72%